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Indian Standard

SPECIFICATION FOR GOLD CHLORIDE (CHLOROAURIC ACID)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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SPECIFICATION FOR GOLD CHLORIDE (CHLOROAURIC ACID)

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Indian Standard

SPECIFICATION FOR GOLD CHLORIDE (CHLOROAURIC ACID)

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 June 1972, after the draft finalized by the Electroplating Chemicals Sectional Committee had been approved by the Chemical Division Council.

0.2 Gold chloride (chloroauric acid), an important starting material for a variety of gold preparations, is finding use in industries like electroplating, decoration of glass and pottery, electronics, etc. This material is affected by exposure to sunlight and is very soluble in water. It should, therefore, be kept in a cool place in well-closed, glass-stoppered bottles or in sealed tubes.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes requirements and methods of sampling and test for gold chloride.

2. REQUIREMENTS

2.1 Description — Gold chloride shall be in bright golden-yellow crystalline form free from dirt, foreign matter and visible impurities and shall correspond essentially to the formula $AuCl_3.HCl.4H_2O$.

2.2 The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods prescribed in Appendix A.

3. PRECAUTIONS IN HANDLING GOLD CHLORIDE

3.1 Gold chloride shall not be handled with bare hands as it has a caustic action causing blisters on the skin.

*Rules for rounding off numerical values (*revised*).

TABLE 1 REQUIREMENTS FOR GOLD CHLORIDE

(*Clause* 2.2)

Sl No.	Characteristic	Requirement	Method of Test (Ref to Cl No. of Appendix A)
(1)	(2)	(3)	(4)
i)	Matter insoluble in ether, percent by mass, *Max*	0·1	A-2
ii)	Gold (as Au), percent by mass, *Min*	47·8	A-3
iii)	Chlorides (as Cl), percent by mass, *Max*	34·4	A-4
iv)	Alkalis and other metals (as sulphates), percent by mass, *Max*	0·2	A-5
v)	Nitrates (as NO_3), percent by mass, *Max*	0·05	A-6

3.2 The material shall be kept protected from light and heat.

3.3 While opening the container adequate care shall be taken to prevent foreign particles from falling into the material.

4. PACKING AND MARKING

4.1 Packing — Gold chloride shall be packed in air-tight containers, preferably with a replaceable closure.

4.2 Marking — The containers shall be marked with the following:

a) Name of material;

b) Net mass, with mass of equivalent gold in bracket;

c) Name of manufacturer and recognized trade-mark, if any; and

d) Date and batch number of manufacture to enable the material to be traced from records.

4.2.1 The containers may also be marked with the ISI Certification Mark.

Note — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING

5.1 The method of preparing representative samples of the material and the criteria for its conformity to this specification shall be as prescribed in Appendix B.

APPENDIX A

(*Clause* 2.2)

METHODS OF TEST FOR GOLD CHLORIDE

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1960*) shall be used in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2. DETERMINATION OF MATERIAL INSOLUBLE IN ETHER

A-2.1 Reagent

A-2.1.1 *Ether* — *See* IS : 336-1964†.

A-2.2 Procedure — Weigh accurately about 2·5 g of the material in a weighing bottle. Add 26 ml of ether to the weighing bottle and dissolve the material carefully. Filter the solution through a tared sintered glass crucible (G No. 4). Rinse the weighing bottle and wash the residue in the crucible with ether and dry at 105 ± 2°C to a constant mass. Retain the filtrate for further test.

A-2.3 Calculation

$$\text{Matter insoluble in ether, percent by mass} = \frac{W_1}{W} \times 100$$

where

W_1 = mass in g of the residue in the sintered glass crucible, and

W = mass in g of the material taken for the test.

*Specification for water, distilled quality (*revised*).

†Specification for ether (*revised*).

A-3. DETERMINATION OF GOLD

A-3.1 Reagents

A-3.1.1 *Concentrated Sulphuric Acid* — *See* IS : 266-1961*.

A-3.1.2 *Saturated Oxalic Acid Solution*

A-3.2 Procedure — Evaporate the filtrate obtained in **A-2.2** to dryness on a steam-bath. Dissolve the dry mass in water and dilute to 100 ml. Add 1 ml of concentrated sulphuric acid followed by 25 ml of a saturated solution of oxalic acid and boil for 1 hour. Add 5 ml of oxalic acid solution and boil again for 5 minutes. Allow to stand on a steam-bath till the supernatant liquid is clear. Filter through a filter paper (Whatman No. 42) containing some ashless filter pulp and wash with hot water. Reserve the filtrate for further test and transfer the filter paper with gold to a tared silica crucible and carefully ignite at 900°C to a constant mass.

A-3.3 Calculation

$$\text{Gold (as Au), percent by mass} = \frac{W_2}{W} \times 100$$

where

W_2 = mass in g of the residue, and

W = mass in g of the material taken for the test (*see* **A-2.2**).

A-4. DETERMINATION OF CHLORIDES

A-4.1 Reagents

A-4.1.1 *Dilute Nitric Acid* — approximately 2 N.

A-4.1.2 *Silver Nitrate Solution* — approximately 1 N.

A-4.2 Procedure — To the filtrate obtained in **A-3.2**, add 40 ml of dilute nitric acid and warm at 50°C. Add slowly with constant stirring 30 ml of silver nitrate solution. Boil until the precipitate has coagulated. Add a drop of silver nitrate solution to make sure that it does not produce turbidity. Set aside in the dark to cool. Filter through a tared sintered glass crucible (G No. 4) and wash the precipitate with warm water. Reserve the filtrate and dry the precipitate at 90 ± 2°C to a constant mass.

A-4.3 Calculation

$$\text{Chlorides (as Cl), percent by mass} = \frac{24{\cdot}74\ W_2}{W}$$

*Specification for sulphuric acid (*revised*).

where

W_3 = mass in g of the precipitate, and

W = mass in g of the material taken for the test (*see* **A-2.2**).

A-5. DETERMINATION OF ALKALIS AND OTHER METALS

A-5.1 Reagents

A-5.1.1 *Dilute Hydrochloric Acid* — approximately 4 N.

A-5.1.2 *Concentrated Sulphuric Acid* — *See* IS : 266-1961*.

A-5.2 Procedure — Heat the filtrate obtained in **A-4.2** to boiling and add 5 ml of dilute hydrochloric acid with constant stirring to precipitate excess silver nitrate as silver chloride. Make sure that the precipitation is complete by adding a few drops of dilute hydrochloric acid and seeing that no turbidity is produced on addition. Allow the precipitate to coagulate and filter through a sintered glass crucible (G No. 4). Wash the precipitate with water. Reject the precipitate and evaporate the filtrate to dryness. Moisten the residue with a few drops of dilute hydrochloric acid, dilute to 20 ml with water, boil and filter. Add 0·5 ml of concentrated sulphuric acid to the filtrate and evaporate to dryness in a tared platinum dish. Ignite gently and weigh and find out the percentage by mass of the residue in respect of the material (W) taken for the test (*see* **A-2.2**).

A-6. DETERMINATION OF NITRATES

A-6.1 Reagents

A-6.1.1 *Sodium Carbonate* — *See* IS : 296-1965†.

A-6.1.2 *Concentrated Sulphuric Acid* — *See* IS : 266-1961*.

A-6.1.3 *Indigo Carmine Solution* — Dissolve 0·10 g of indigo carmine, previously dried for 2 hours at 105°C in a mixture of 10 ml of sulphuric acid and 80 ml of water, and dilute to 100 ml.

A-6.2 Procedure — Weigh accurately 0·1 g of the material and dissolve in 5 ml of water. Add 0·5 g of sodium carbonate, evaporate to dryness and ignite gently. Cool, take up the residue with 10 ml of water and filter. To 5 ml of the filtrate add concentrated sulphuric acid dropwise till effervescence ceases, then add 0·1 ml of indigo carmine solution and 5 ml of concentrated sulphuric acid.

A-6.2.1 The material shall be taken as having satisfied the requirement of the test if the blue colour does not stay longer than 30 seconds.

*Specification for sulphuric acid (*revised*).

†Specification for sodium carbonate, anhydrous (*revised*).

APPENDIX B

(*Clause* 5.1)

SAMPLING OF GOLD CHLORIDE AND CRITERIA FOR CONFORMITY

B-1. GENERAL REQUIREMENTS OF SAMPLING

B-1.1 In drawing, preparing, storing and handling the test sample, the precautions given in **3** shall be strictly observed.

B-1.2 The sampling implement and the sample container shall be clean and dry.

B-2. SCALE OF SAMPLING

B-2.1 In a single consignment, all the containers from the same batch of manufacture shall be grouped together to form a lot.

B-2.2 Each lot shall be separately tested for ascertaining its conformity to the specification. The number of containers (n) to be sampled from each lot (N) is given in Table 2. These n containers shall be selected at random with the help of random number tables. Guidance for random selection procedures may be had from IS : 4905-1968*.

TABLE 2 SCALE OF SAMPLING

Lot Size	Sample Size
N	n
Up to 10	1
11 to 50	2
51 and above	3

B-3. NUMBER OF TESTS

B-3.1 From each of the selected containers 3 g of gold chloride shall be withdrawn. These portions shall be thoroughly mixed to form a composite sample. Tests for all characteristics shall be conducted on this composite sample.

B-4. CRITERIA FOR CONFORMITY

B-4.1 All the test results shall satisfy the corresponding requirements if the lot is to be accepted as conforming to this specification.

*Methods for random sampling.

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